

Notice of Allowability

Application No.

09/870,704

Examiner

Albert Wang

Applicant(s)

ALIAHMAD ET AL.

Art Unit

2115

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-24.
3. ☒ The drawings filed on 01 June 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date 11102004.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

THIS CASE HAS BEEN
EXAMINED BY THE EXAMINER
ON 06/01/2003

EXAMINER'S AMENDMENT

1. Original claims 1-24 are presented for examination.
2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with David Purks (reg. no. 40,133) on November 4, 2004.

Claims 1 and 31 of the application have been amended as follows:

1. (Currently amended) An apparatus for detecting and correcting the timing skew of a data signal in a parallel data transmission system, comprising:

a data path for adjusting the timing skew of the data signal with respect to a clock signal, said data path including: a delay digital-to-analog converter (DAC), a falling edge DAC, at least two receive registers, an output multiplexer, and control logic;

a clock path for correcting the duty-cycle of a receive clock and for delaying said receive clock in normal receive operations, wherein said clock path is selectably switchable between a timing skew correction mode and a receive-data mode;

a local accurate tuning system for generating a timing signal to tune all of the delay elements of said parallel data transmission system according to [said] a bit-cell time of the data signal;

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wherein said control logic detects the timing skew of the data signal and controls said delay DAC and said falling edge DAC to provide appropriate delay to the data signal in accordance with the detected timing skew of said data signal.

31. (Currently amended) A method for detecting and correcting the timing skew of data in a parallel data transmission system having a receive clock and at least one data signal with a bit-cell time, the method comprising:

generating a tuning signal having an amplitude based on a local accurate clock;

correcting the duty-cycle of the receive clock according to said tuning signal and the bit-cell time;

determining the time delay of said at least one data signal relative to the receive clock and said tuning signal;

adjusting the time delay of said at least one data signal relative to the receive clock;

adjusting the time delay of falling edges of said at least one data signal relative to said receive clock;

capturing data from said at least one data signal on the rising and falling edges of said receive clock; and

swapping the outputs of [the] at least two receive registers used in said capturing if the detected time-skew of said at least one data signal reaches a predetermined level.

3. Claims 1-24 are allowed.

4. The following is an examiner's statement of reasons for allowance:

SCSI Trade Association, "Ultra320 SCSI : New Technology – Still SCSI", March 2001, teaches correcting timing skew on data paths in a parallel bus (pages 2 & 3, Training Pattern), but does not describe of delay elements for correcting skew.

Collins et al., U.S. Patent No. 6,031,847, teaches delay circuitry and control logic for correcting skew for parallel data paths (figs. 3-6, delay stack structure 303 and controller 320), including a clock path (col. 12, lines 14-21), as well as a timing skew correction mode (fig. 13; col. 15, lines 13-21), but does not expressly teach correcting the duty-cycle of a receive clock.

Oprescu et al., U.S. Patent No. 5,467,464, teaches correcting the duty cycle of a receive clock (col. 5, lines 9-24).

Baco, U.S. Patent No. 5,968,180, teaches a data path with a multiplexer for swapping the outputs of two receive registers (fig. 2, mux 39), but does not expressly teach adjusting timing skew on the data path with delay elements.

Brown et al., U.S. Patent No. 6,553,505, is assigned to the assignee of the instant application.

The prior art of record does not teach or suggest, individually or in combination, a system for correcting skew on a parallel bus, where data paths include a delay DAC and a falling edge DAC (as defined in the instant specification), and a multiplexer for swapping the outputs of two receive registers on the data path, and for correcting the duty cycle of the receive clock on a clock path using a timing skew correction mode.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Albert Wang whose telephone number is 571-272-3669. The examiner can normally be reached on M-F (9:30 - 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas C. Lee can be reached on 571-272-3667. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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November 10, 2004


